3-2014

Into the Minds of Dogs and Bonobos

Brian Hare
Duke University

THANK YOU!

Hanus & Call, 2011

The Cognitive Approach

Traditional Approach:

Intelligence

less ← → more

Cognitive Approach:

- Navigation
- Memory
- Social Learning
- Inhibitory Control
- Empathy

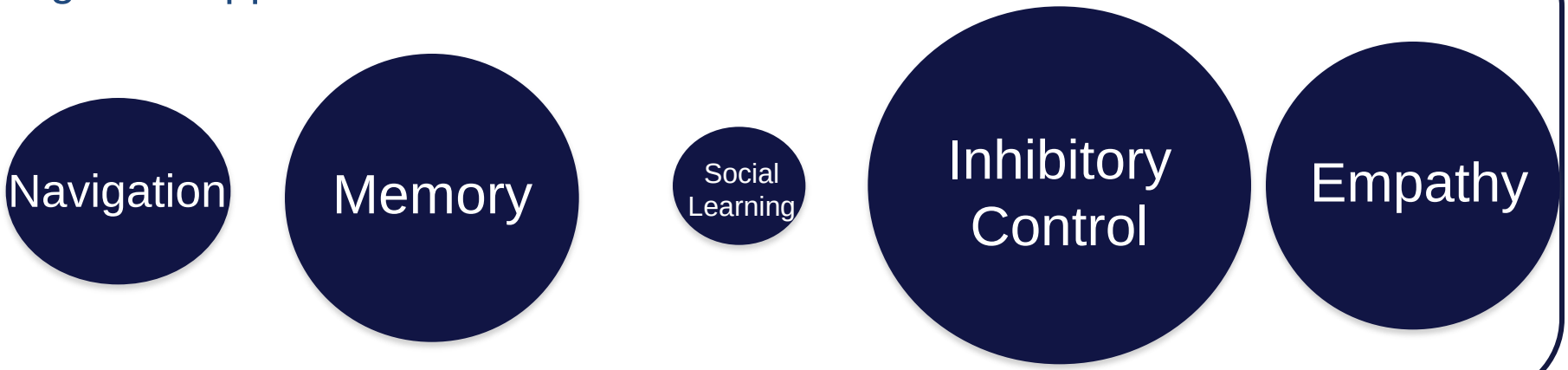
The Cognitive Approach

Traditional Approach:

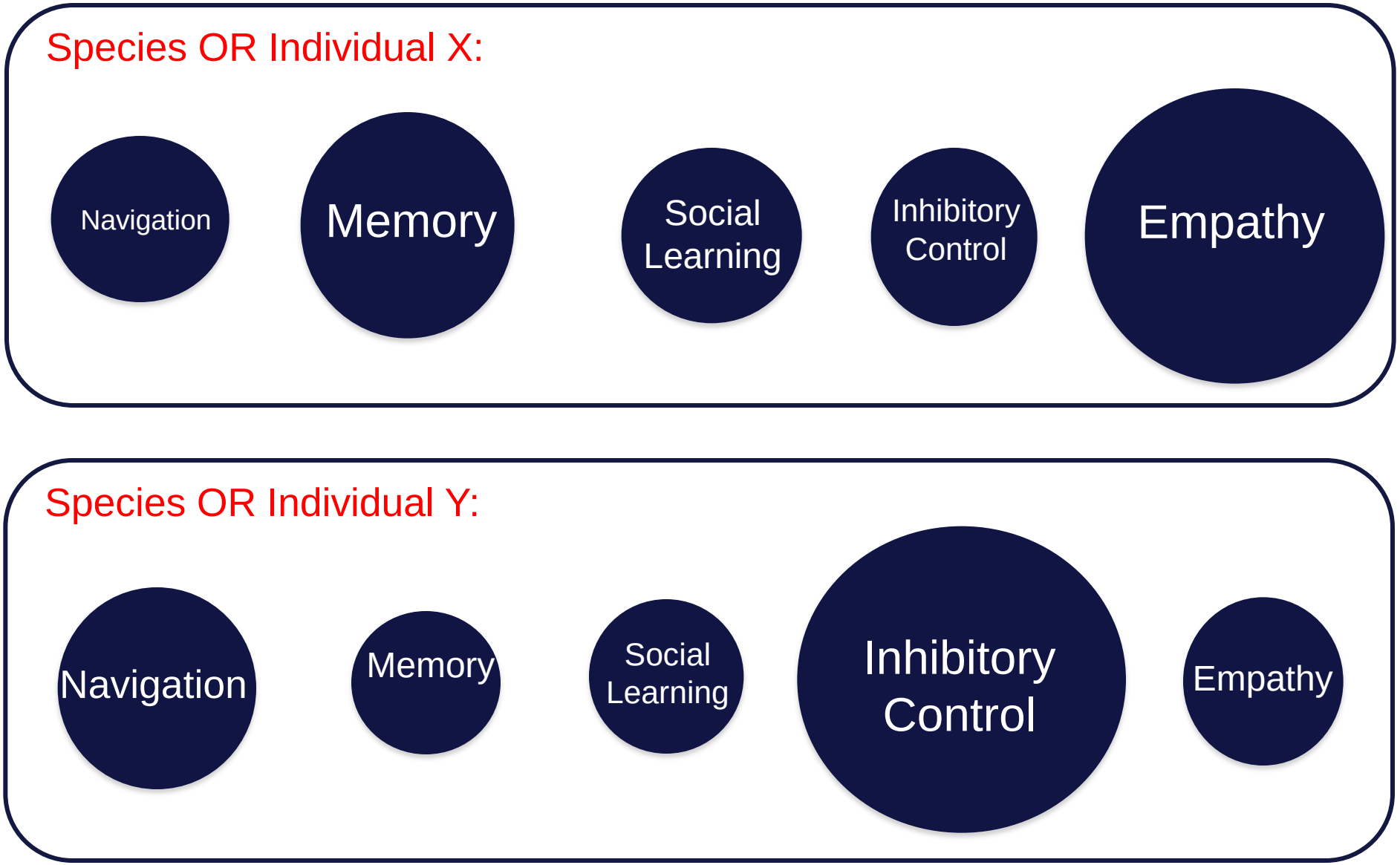
Intelligence

less ← → more

Cognitive Approach:



The Cognitive Approach



Hare & Kwetuenda, 2010

Tan & Hare, 2013

WHO IS THE MOST INTELLIGENT

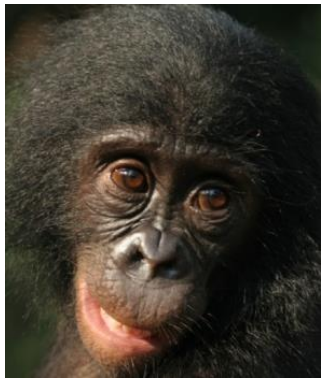
or

MOST “HIGHLY” EVOLVED APE?

Chimpanzees

Homo “sapiens”

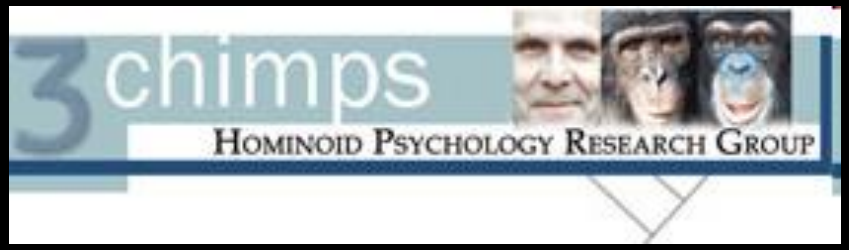
Bonobos



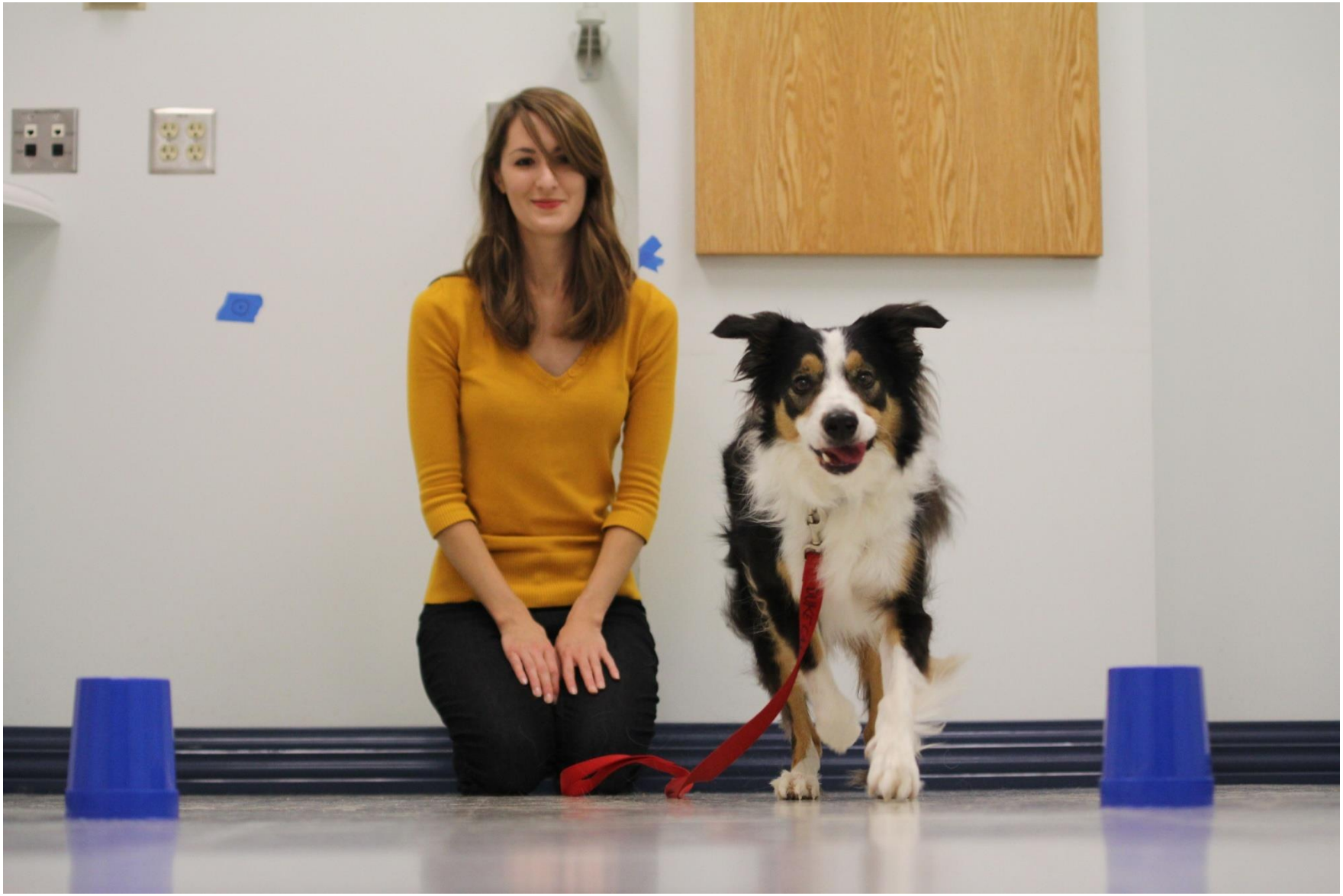
Our 2 guiding questions:

What is it that makes us human?

How did we get that way?




CANINE COGNITION CENTER
DUKE



NEW YORK TIMES BESTSELLER

— BRIAN HARE and VANESSA WOODS —

THE GENIUS OF DOGS

HOW DOGS ARE SMARTER THAN YOU THINK

Dognition™

How it works

1 Play the Science-Based Games
- in the comfort of your home -

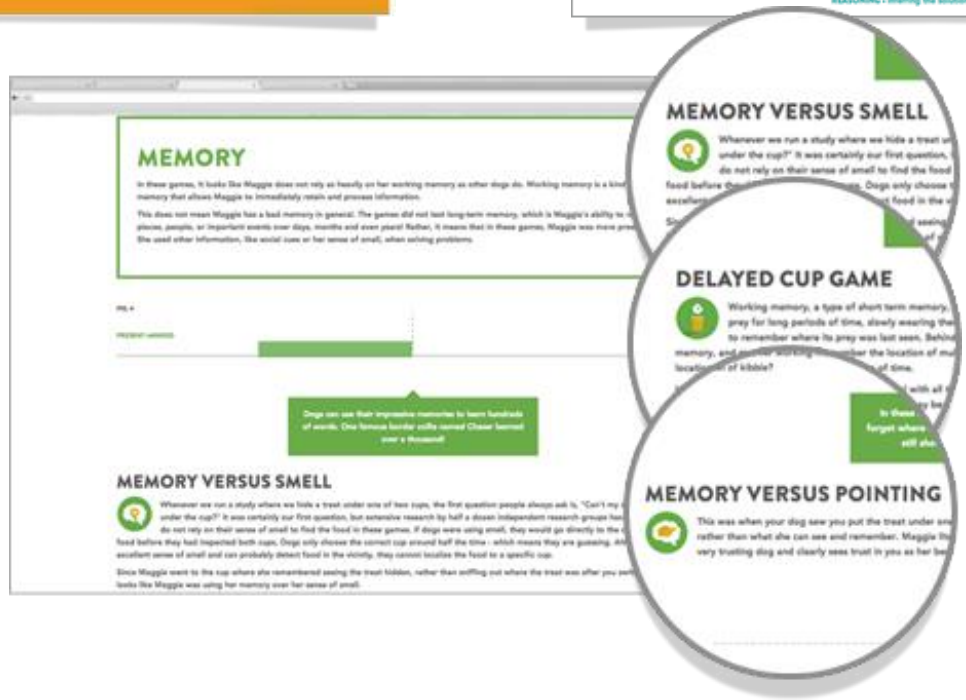
2 Record Your Dog's Responses
- with our innovative online tool -

3 Learn From the Results
- in your detailed Dognition Profile report -

4 Compare Your Dog to All Dogs
- with our data visualization tool -

GET STARTED

Finish the games = instant individualized report!



My predictions for *Tasmania*

- Low empathy

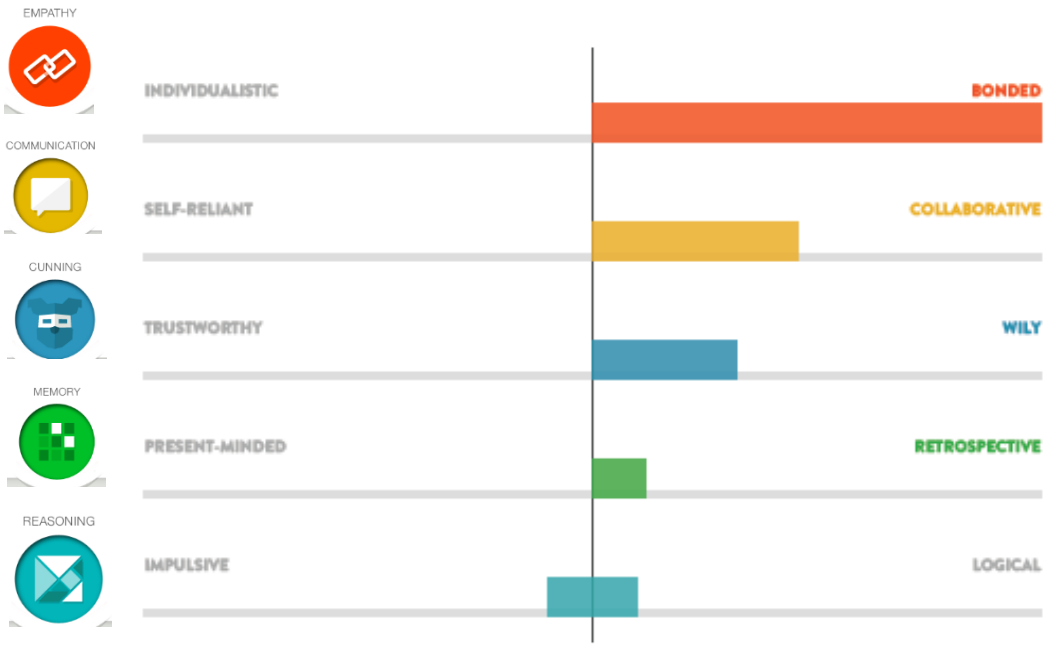
- High communication

- High cunning

- High memory

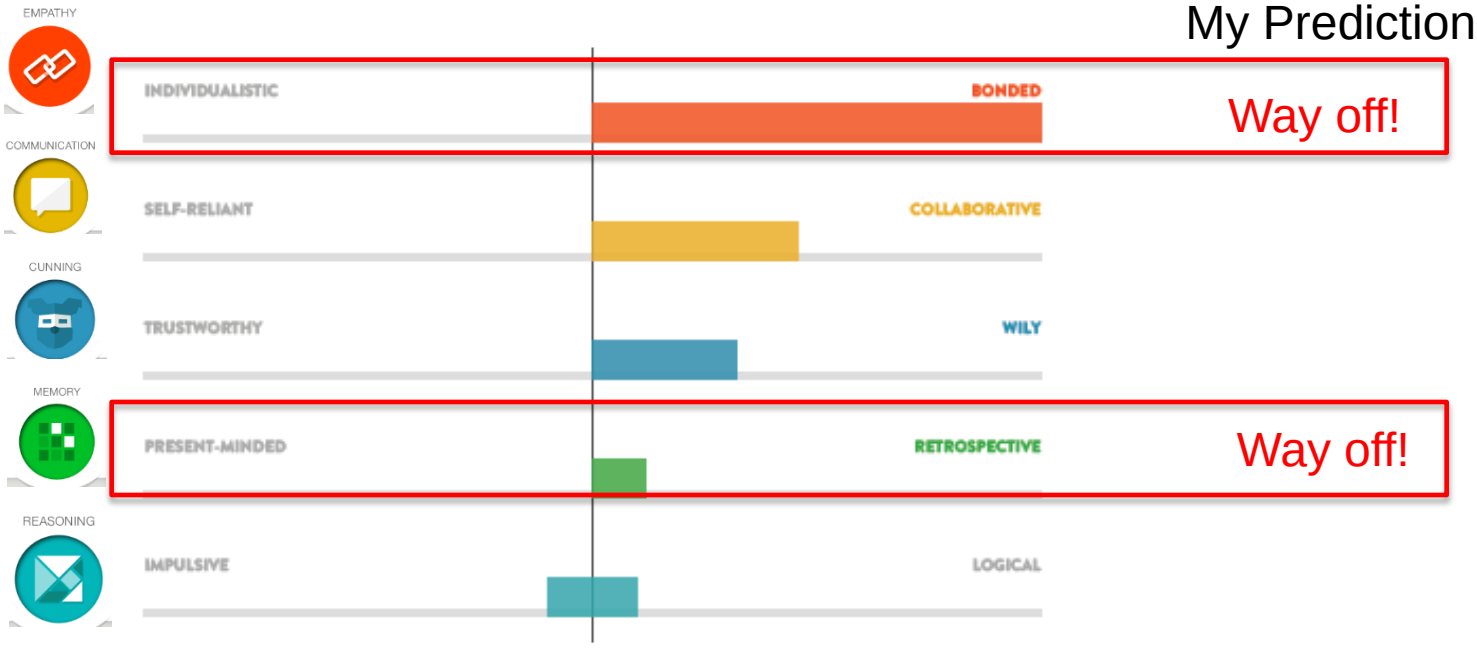
- Low reasoning

My results for *Tasmania*



My results for *Tasmania*

My Predictions

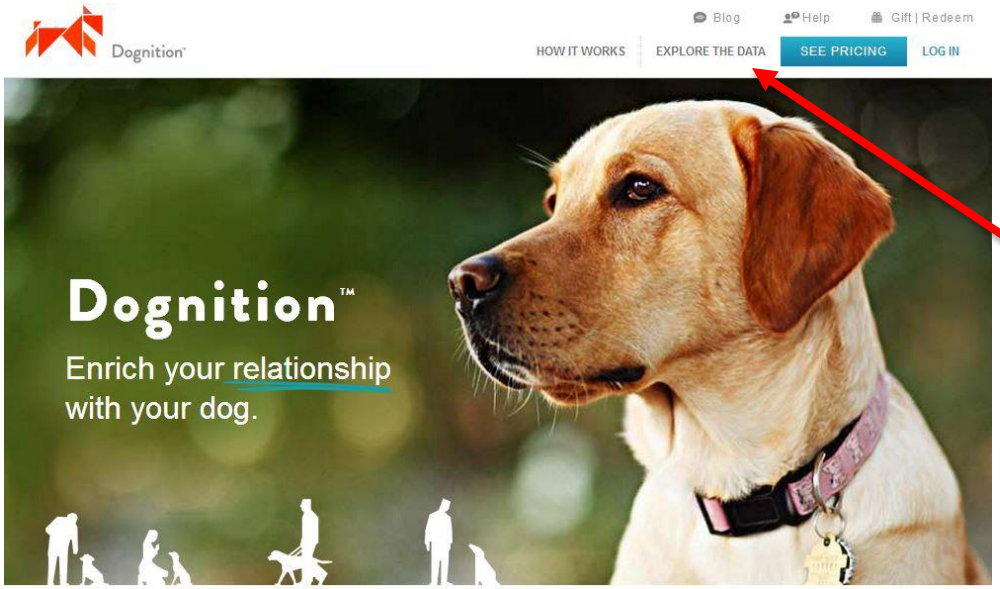


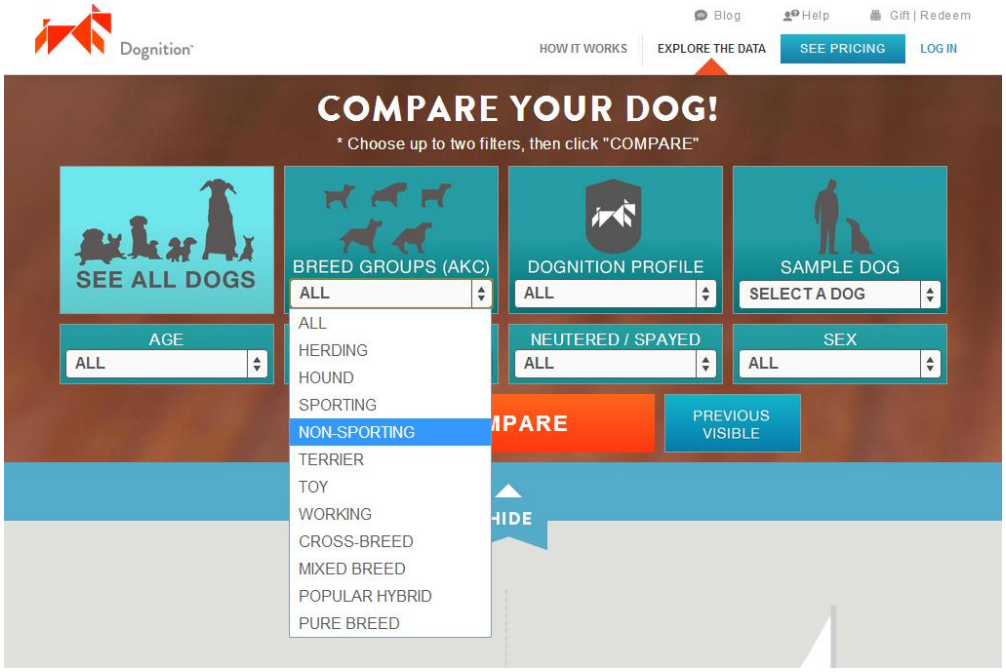
CITIZEN SCIENCE =

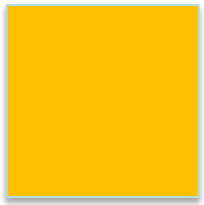
= Largest dataset in history!

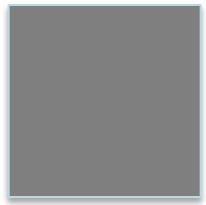
Source: Google Scholar. Reflects the most widely cited canine cognition studies.


You and thousands of others take part in Dognition


Dognition
Blog
Help
Gift | Redeem
HOW IT WORKS
EXPLORE THE DATA
SEE PRICING
LOG IN
Dognition™
Enrich your relationship
with your dog.


Dognition
Blog
Help
Gift | Redeem
HOW IT WORKS
EXPLORE THE DATA
SEE PRICING
LOG IN
COMPARE YOUR DOG!
* Choose up to two filters, then click "COMPARE"
SEE ALL DOGS
BREED GROUPS (AKC)
ALL
DOGNITION PROFILE
ALL
SAMPLE DOG
SELECT A DOG
AGE
ALL
NEUTERED / SPAYED
ALL
SEX
ALL
ALL
HERDING
HOUND
SPORTING
NON-SPORTING
TERRIER
TOY
WORKING
CROSS-BREED
MIXED BREED
POPULAR HYBRID
PURE BREED
PREVIOUS VISIBLE





Toolkit

Yawn Game

Eye Contact Game

Arm Pointing

Foot Pointing

Watching

Turn Your Back

Cover Your Eyes

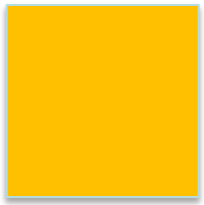
Memory vs Pointing

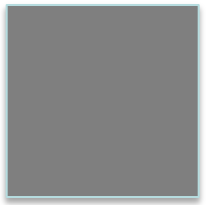
Memory vs Smell

Delayed Cup Game

Inferential Reasoning Game

Physical Reasoning Game





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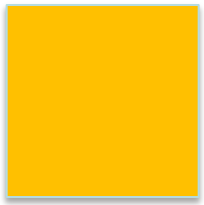
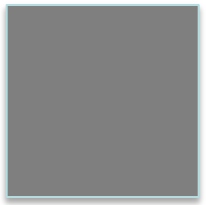
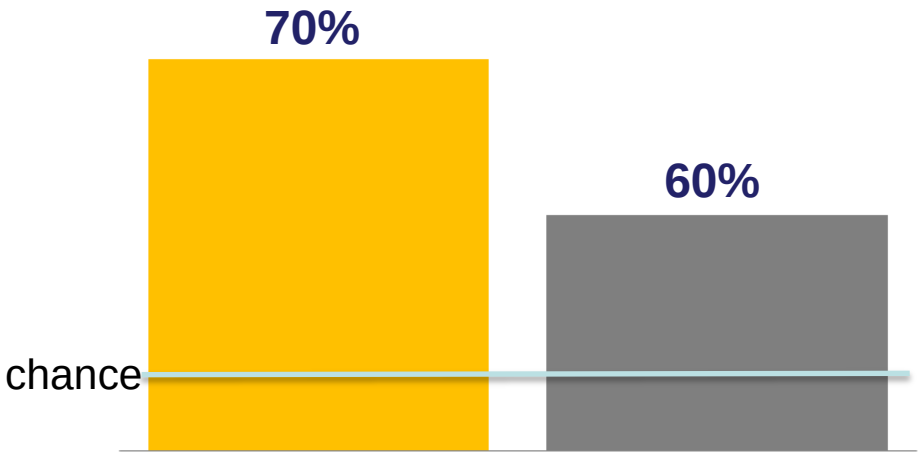
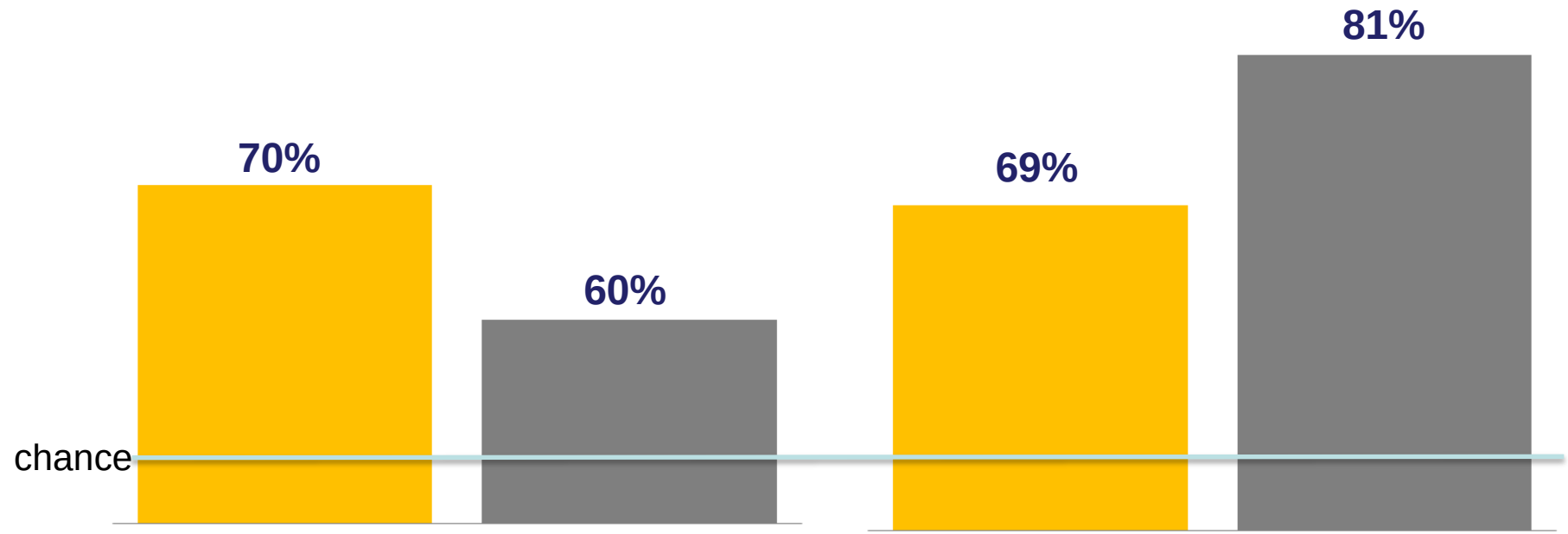






Following a Pointing Gesture

Relying on Memory



Arm Pointing

Following a Pointing Gesture

Memory vs Smell

Relying on Memory

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ARC
Ape Research Consortium

Wild, Sanctuary & Zoo

Health Research

Cognitive Research

Behavioral Research

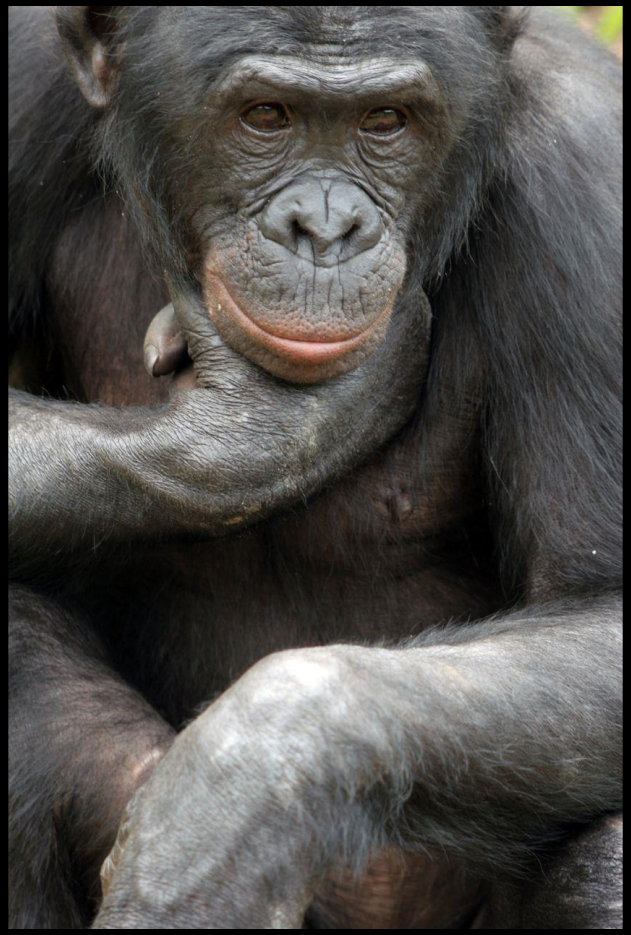

HABITAT LOSS


BUSHMEAT TRADE


PET TRADE

PASA
PAN AFRICAN SANCTUARY ALLIANCE

Why are there sanctuaries?



Goals:

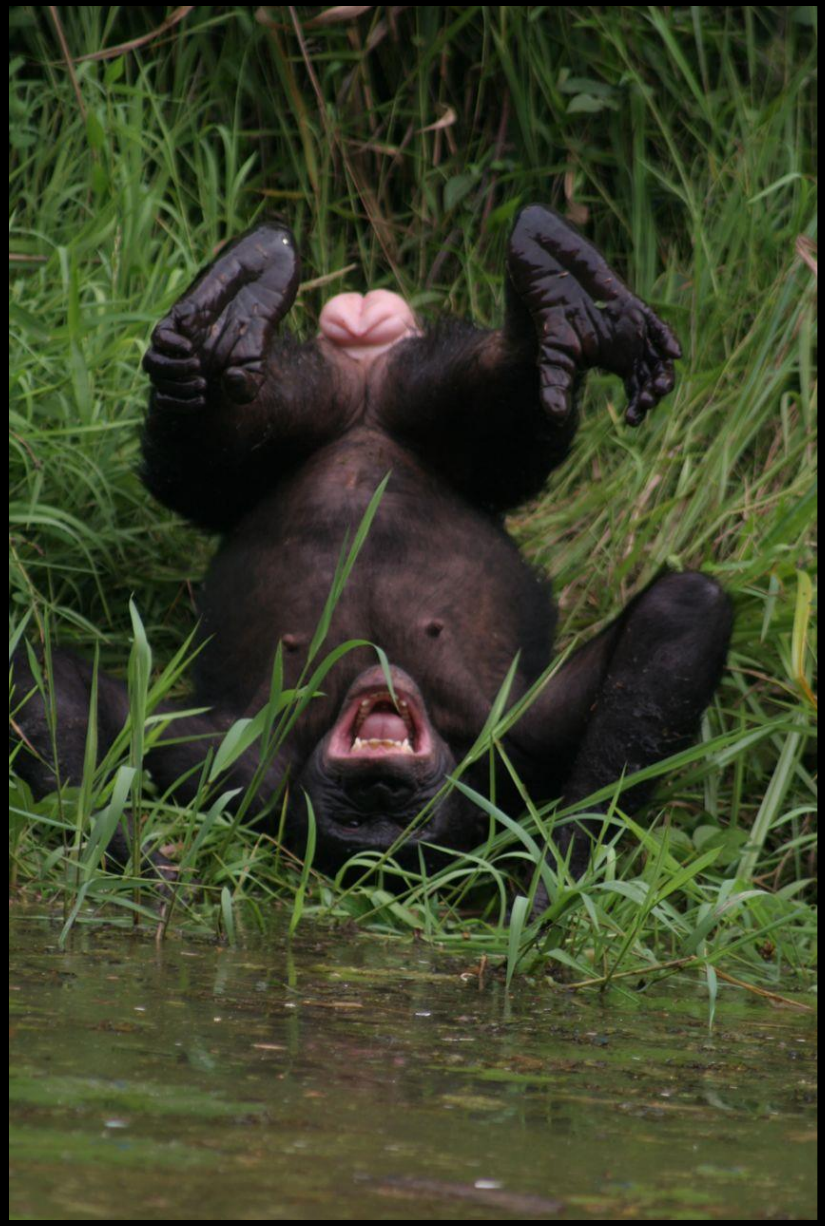
- Enforce laws banning the trade of apes as pets

- Provide example of welfare standard that captive apes deserve in providing lifetime care

- Educate people in habitat countries about conservation status of wild apes and about welfare / kindness more generally

- Reintroduce apes back into the wild when possible

Care of the Sanctuary Apes



How Big is Big?

sanctuaries are ideal for non-invasive genetics, cognition, behaviour, disease, morphology and physiology research

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ARC Members

These are our current members. You can see all our current members on our world map.

Researcher Requests

The goal of ARC is to facilitate academic research while also allowing captive ape managers to make requests for applied research. This page provides a platform for researchers to propose a research question that they hope an ARC member site will help them answer.

Research Opportunities

The goal of ARC is to facilitate academic research while also allowing captive ape managers to make requests for applied research. This page provides a platform for managers to propose a topic of research that they hope a researcher will help them address.

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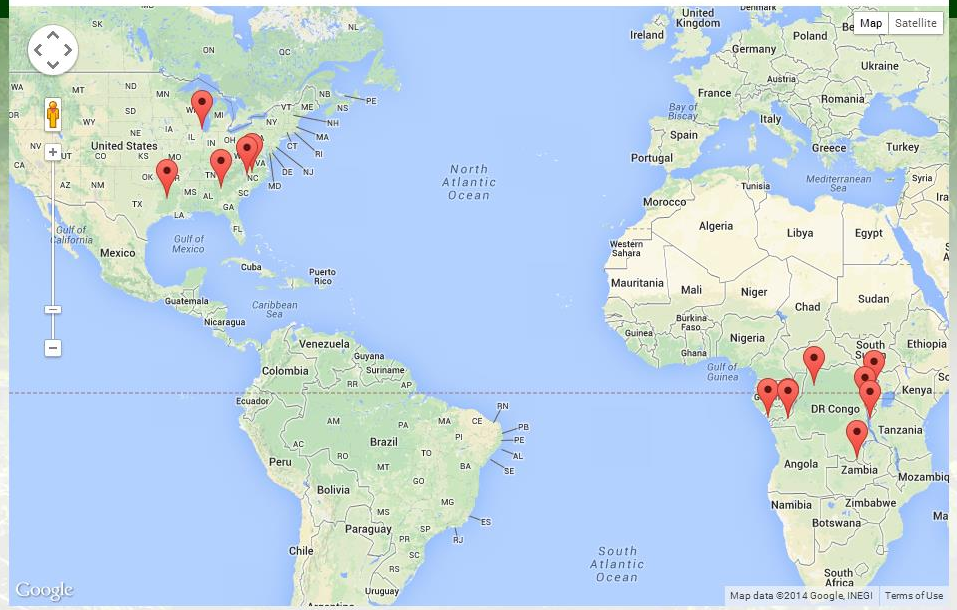
Institutions

These are the founding members. A number of other organizations will soon be going ARC.



<< ARC Institution List

friends of bonobos

Lola Ya Bonobo

Kinshasa , Kinshasa
Democratic Republic of Congo
http://www.friendsofbonobos.org/

Description

Founded by Claudine Andre in 1994, Lola ya Bonobo is the sanctuary of the NGO, Les Amis des Bonobos du Congo (ABC). Since 2002, the sanctuary has been located at Les Petites Chutes de la Lukaya, just outside of Kinshasa in the Democratic Republic of Congo (link to ARC map). Lola ya Bonobo means 'paradise for bonobos' in Lingala, the main language of Kinshasa.

Contact Information

info@friendsofbonobos.org

Population Description

- 63 bonobos (link to .doc "Lola ya Bonobos 2012")
- 30 females and 33 males
- Ranging in age from 0-23 years of age with 22 individuals 6 years or younger
- Each of 4 groups (1 nursery and 3 mix age-sex groups) contain between 10-23 individuals

Research Description

Cognitive, behavioral, physiological, genetic, morphological and health research has all been conducted at Lola ya Bonobo since 2005. This has resulted in 30 publications between the years 2007-2012 (link to publications below).

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All Publications

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- 2013 | Spontaneous triadic engagement in bonobos (Pan paniscus) and chimpanzees (Pan troglodytes). Journal of Comparative Psychology.
- 2013 | Chimpanzees and Bonobos Exhibit Emotional Responses to Decision Outcomes. PLoS One.
- 2013 | Bonobos share with strangers. PLoS One.
- 2013 | Different ontogenetic patterns of testosterone production reflect divergent male reproductive strategies in chimpanzees and bonobos. Physiology & Behavior.
- 2013 | Anxiety-related behavior of orphan chimpanzees (Pan troglodytes schweinfurthii) at Gombe National Park, Tanzania. Primates.
- 2013 | Reproductive ecology of wild chimpanzees. American Journal of Primatology.
- 2013 | Pant hoot chorusing and social bonds in male chimpanzees. Animal Behaviour.
- 2013 | First molar eruption, weaning, and life history in living wild chimpanzees. PNAS.
- 2013 | Validation of a Field Technique and Characterization of Fecal Glucocorticoid Metabolite Analysis in Wild Chimpanzees (Pan troglodytes). American Journal of Primatology.
- 2013 | Gene Flow and Genetic Diversity of Chimpanzees in Tanzanian Habitats. Conservation International.
- 2013 | Spontaneous Triadic Engagement in Bonobos (Pan paniscus) and Chimpanzees (Pan troglodytes). Journal of Comparative Psychology.
- 2012 | The bonobo genome compared with the chimpanzee and human genomes. Nature.
- 2012 | Majority-biased transmission in chimpanzees and human children but not orangutans. Current Biology.
- 2012 | Are there geniuses among the apes? Philosophical Transactions of the Royal Society.
- 2012 | Education program evaluation at multiple primate sanctuaries in equatorial Africa. International Journal of Primatology.
- 2012 | The self-domestication hypothesis: bonobo psychology evolved due to selection against male aggression. Animal Behaviour
- 2012 | Communication during sex among female bonobos: effects of dominance, solicitation and audience. Scientific Reports.
- 2012 | High Diversity at PRDM9 in Chimpanzees and Bonobos. PLoS One.

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Monitor: bushmeat trade and zoonotic disease

DUKE GLOBAL HEALTH INSTITUTE

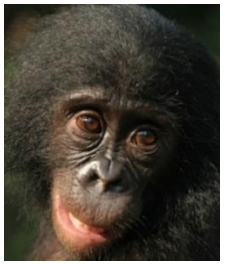
Chris Woods

Shenglan Tang

Anne Rimoin

PASA
PAN AFRICAN SANCTUARY ALLIANCE

- Bushmeat markets / sanctuary orphans



- DRC Airports

- Chinese immigrant labor

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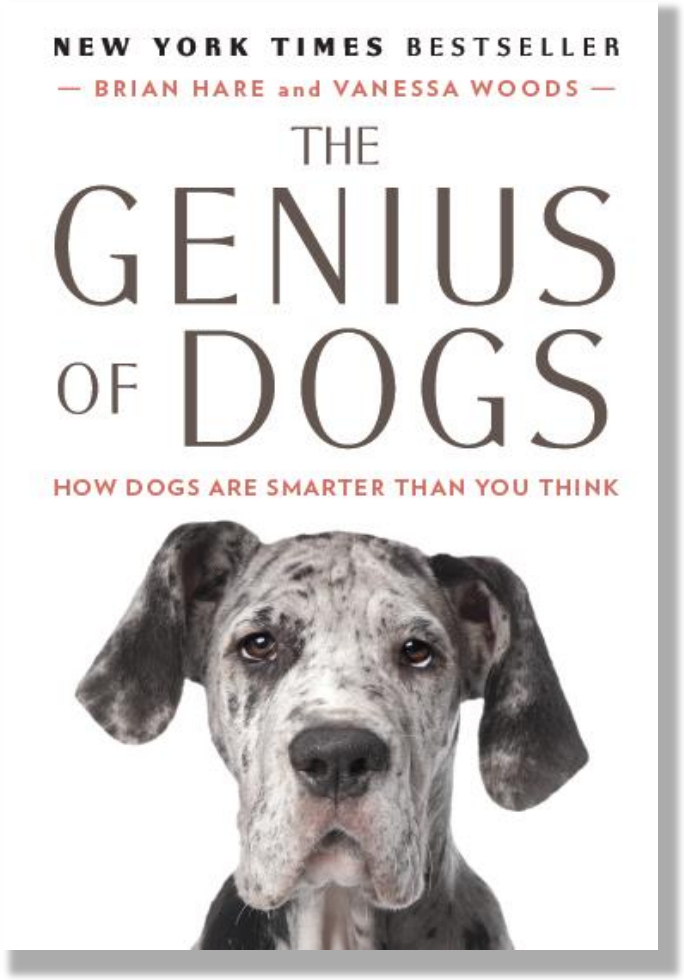
Wild, Sanctuary & Zoo

Health Research

Cognitive Research

Behavioral Research

QUESTIONS?



Dognition™

Find the genius in your dog.

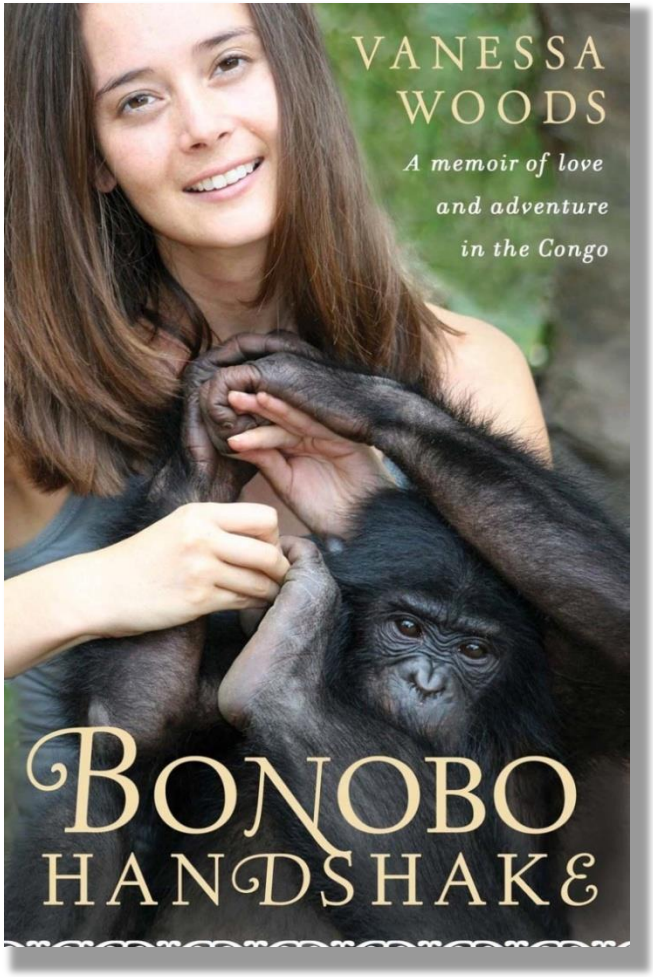


Fig. 1 The artificial "bug-egg" from top and bottom (see text for details; photo R. Nagel)

Up to 2.5 ml of blood

BLEEDING PRIMATES WITHOUT NEEDLE
STRESS-FREE BLOOD SAMPLING THROUGH BLOOD-SUCKING BUGS

R. Thomsen[1], C.C. Voigt[2]

[1]University of Leipzig, Leipzig, Germany, [2]Institute for Zoo and Wildlife Research, Berlin, Germany

Presenter's Email: rthomsen@uni-leipzig.de

Ruth Thomsen · Christian C. Voigt

Non-invasive blood sampling from primates using laboratory-bred blood-sucking bugs (*Dipetalogaster maximus*; Reduviidae, Heteroptera)

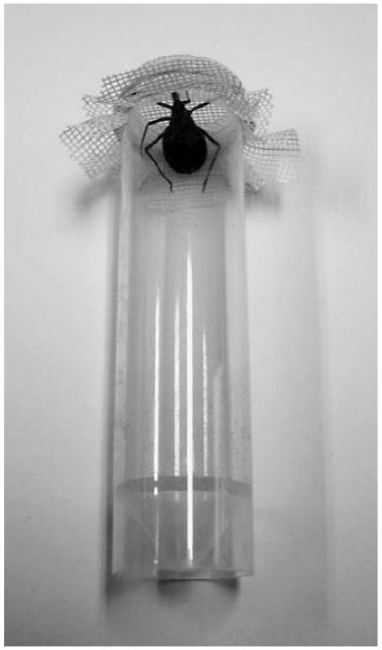
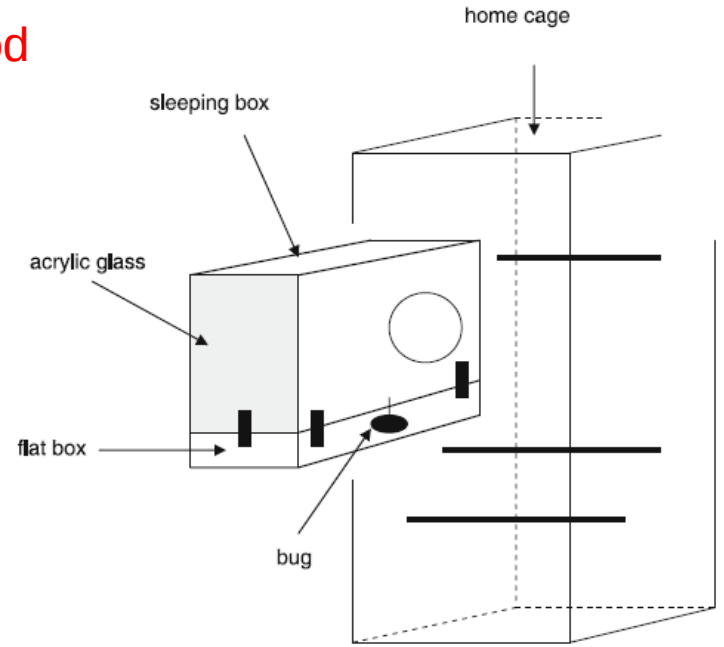
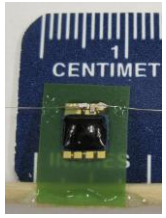


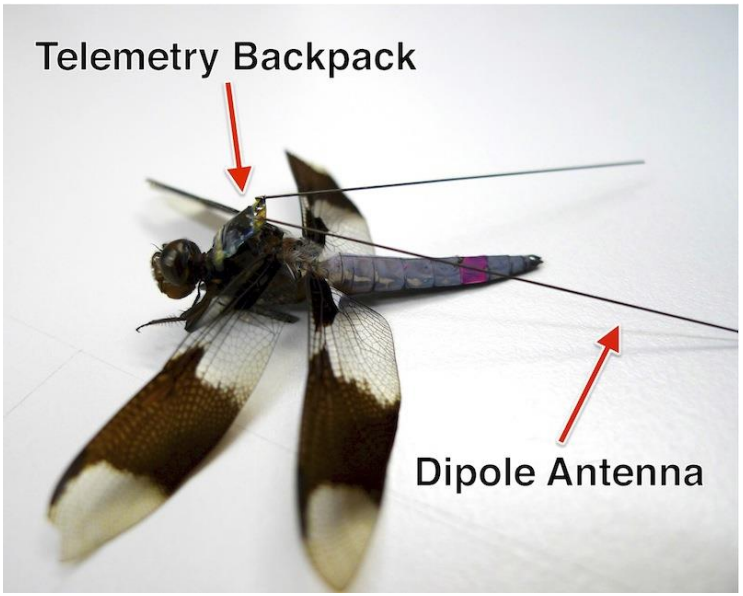
Table 1 Success rates of the use of laboratory-bred blood-sucking bugs (*Dipetalogaster maximus*) for bleeding captive primates

	Microcebus murinus ($n=3$)	*Pan paniscus* ($n=2$)	*Pongo abelii* ($n=1$)
Trials (n)	4	5	3
Success	4/4 (100%)	5/5 (100%)	2/3 (66.7%)
Bug size	L2	L5 and Imago	L5 and Imago
Time (min)	8–20	6–62	8–33
Blood volume (ml)	0.01–0.2	0.1–2.4	0.3 and 0.5

Up to 2.5 ml of blood







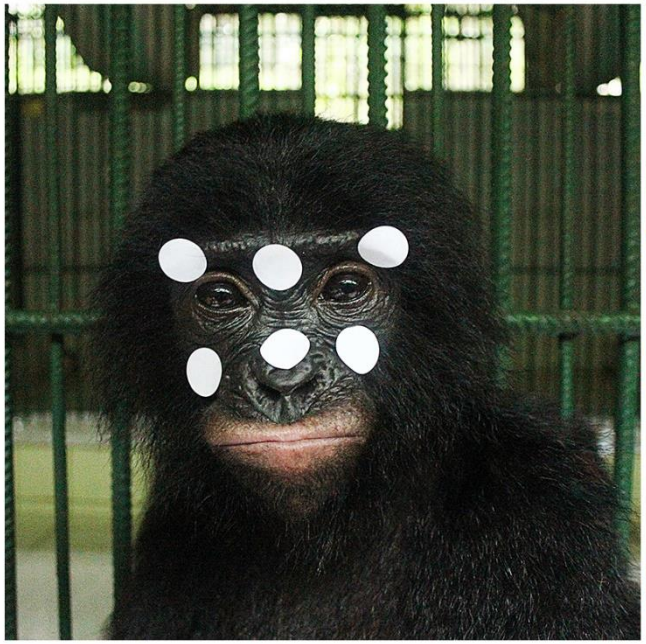
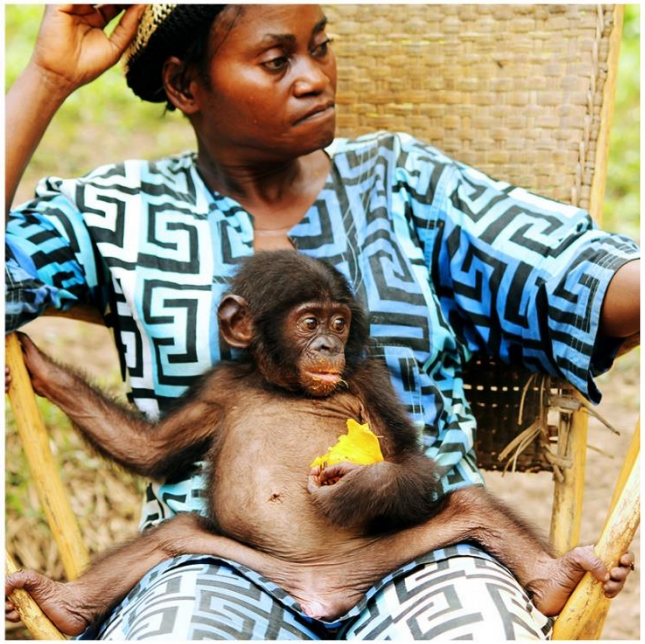


Fig 1a. an adult female with 6 stickers



1b. an infant resting on her caregiver

Current cognitive neuroscience is dominated by research on a few species of laboratory animals and humans from industrialized societies

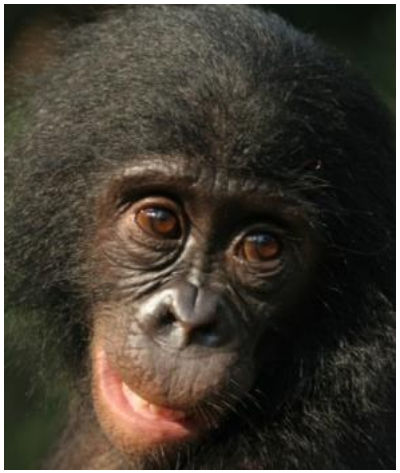
We used PubMed to conduct a literature survey of empirical research articles published between 2010-07-01 and 2012-07-01 in the top four cognitive neuroscience journals and top four general science journals

Among the 4020 articles on the major neuroscientific techniques (positron emission tomography/PET, magnetic resonance imaging/MRI, transcranial magnetic stimulation/TMS, GSR, EEG, EMG, body temperature and heart rate, see Harmon-Jones & Beer 2009),

980 articles studying nonhuman animals. All conducted with laboratory animals and only 3 w/ apes. All studies with awake animals invasive.

3175 human studies were all conducted on industrialized populations.


GREAT NECK



"36% of americans believe animal testing is "morally wrong"

Model

Implication

Current: Education / Marketing

1) People don't understand the role of animals in research.

2) We must fight radical groups who are brainwashing public

Educate and Market

Alternative: Biology of Empathy

1) Humans evolved to respond empathically towards animate beings

2) Humans are more empathic to familiar social beings

3) U.S. family practices and TV culture promotes empathy toward species used in medical tests

Aggressively: flaunt improvement in welfare standards & benefit of research to animals themselves

Do researchers have positive associations with Welfare?

Do they see Welfare as fun & cool?

**I could find not studies on researchers attitudes toward welfare

Time Consuming Regulation!!!

Real & Perceived Threat of Danger

Militant Animal Rights / Welfare Groups

Animals can be unpredictable and carry diseases = dirty and dangerous

Human-chimpanzee interactions that permit limited contact in a safe manner can be achieved (photo by K. Baker).

Chimpanzees

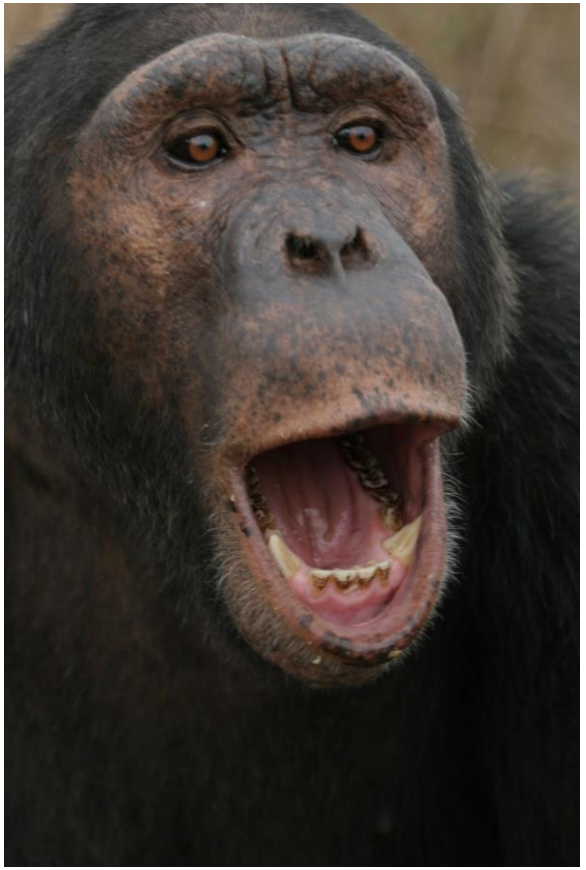
Kate Baker, Ph.D.
Tulane National Primate Research Center

for nonhuman primates enrichment

Animals Fault:

We are stuck with violent and disgusting animals…

“Macaques are violent monkeys!”



“Chimpanzees are disgusting!”

(masturbating excessively and throwing feces)

1) Only 2% of articles cite NIH funding in two highest impact Welfare Journals

Solution: offer funds for 1-2 work study students per year for welfare projects (great undergrad thesis projects!)

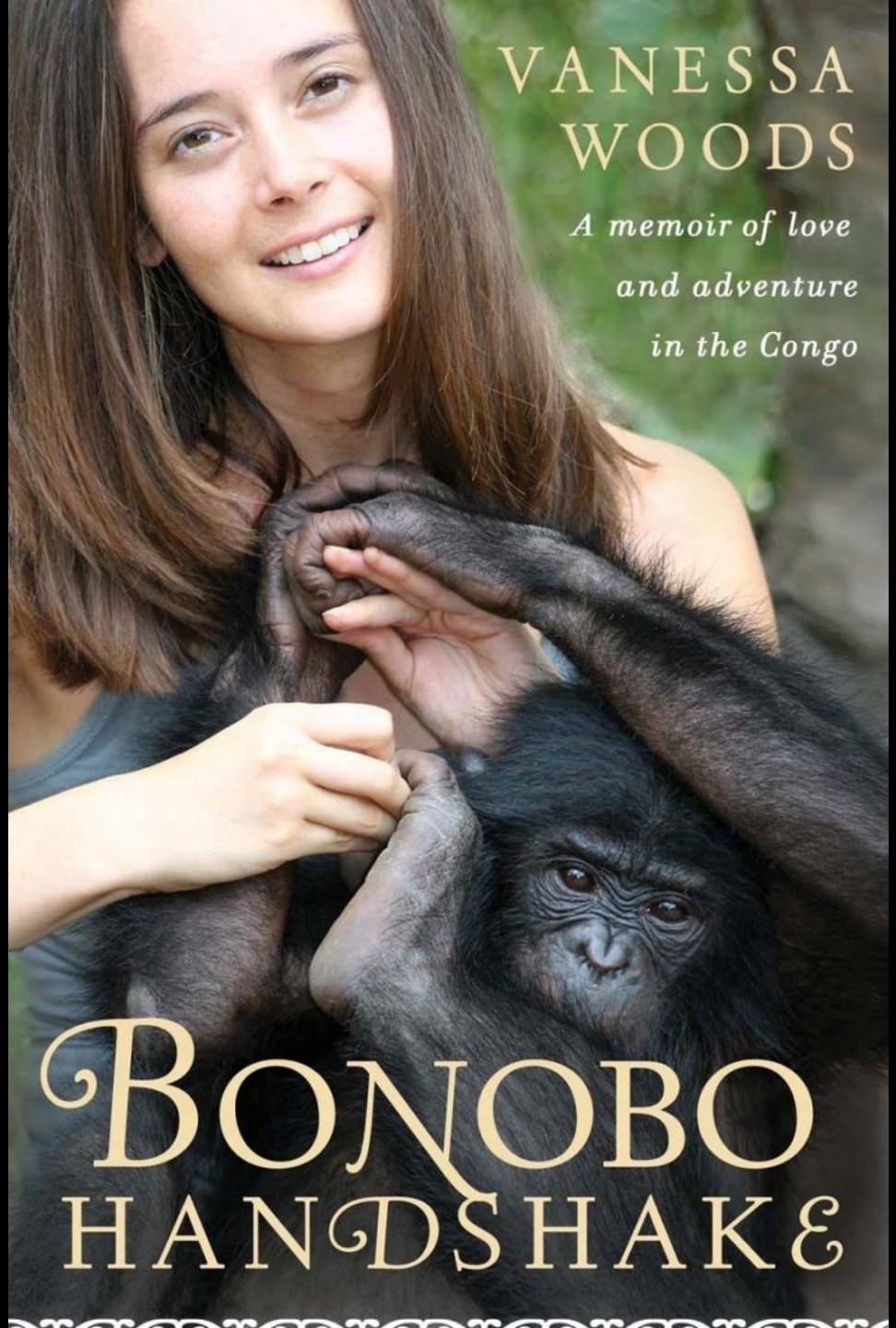
TOP Welfare Journals from 2009	Vol	Tot # of articles	NIH funded	% of NIH funded
Applied Animal Welfare Science	12	27	3	11%
Applied Animal Behaviour Science	116-121	170	1	0.5%
		197	4	2%

2) How many journal articles aimed at improving the welfare of their own lab animals do NIH funded researchers publish each grant cycle?

Solution: reward a minimum of one such publication per grant cycle


BUSHMEAT TRADE


PET TRADE


VANESSA
WOODS
A memoir of love
and adventure
in the Congo
BONOBO
HANDSHAKE

NEW YORK TIMES BESTSELLER

— BRIAN HARE and VANESSA WOODS —

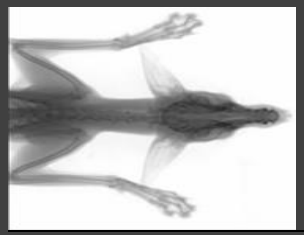
THE GENIUS OF DOGS

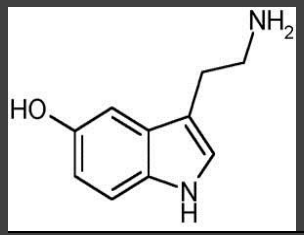
HOW DOGS ARE SMARTER THAN YOU THINK

For 45 Years : selected kits showing least fear and aggression toward a human

Reviewed in Trut (2003)

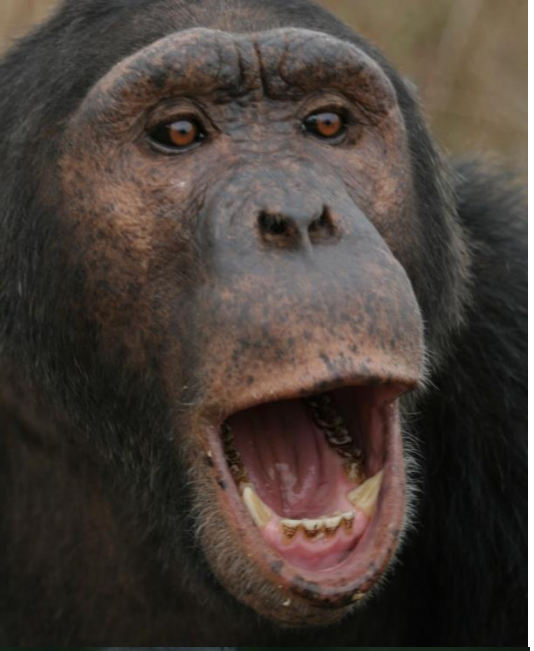
Experimental Population



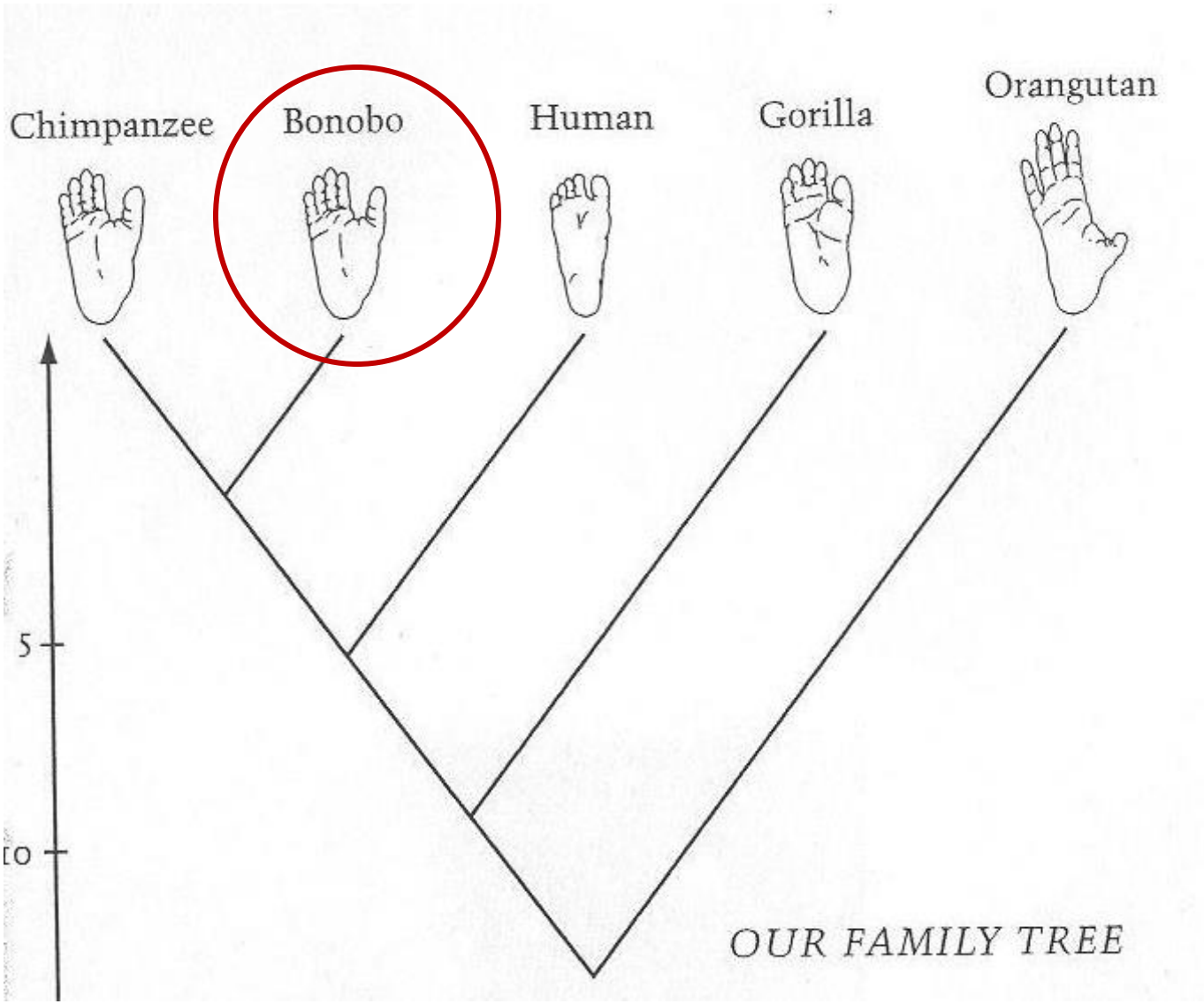


Experimental (vs. control pop.)

Floppy Ears	
Star Mutation	
Curly Tails	Higher Levels
Piebald Coats	
Feminized Cranium	
Skeletal Gracilization	
Serotonin	Higher Levels
Corticosteriods	Lower Levels
Approach Human	
Tail wagging	Higher Levels
Barking / Crying	



A bonobo? What is that?

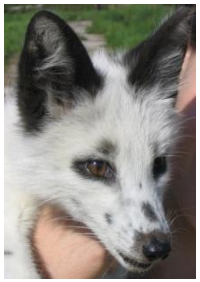
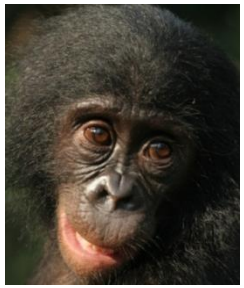


little Mimi (33 kg)

Is not dominated by

BIG Tatango (46 kg)

Can we identify the cognitive skills predictive of success in various working environments?

US?

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Review

The self-domestication hypothesis: evolution of bonobo psychology is due to selection against aggression

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self-domestication hypothesis

Experiments indicate that selection against aggression in mammals can have multiple effects on their morphology, physiology, behaviour and psychology, and that these results resemble a syndrome of changes observed in domestic animals. We hypothesize that selection against aggression in some wild species can operate in a similar way. Here we consider the bonobo, *Pan paniscus*, as a candidate for having experienced this 'self-domestication' process. We first detail the changes typically seen in domesticated species including shifts in development. We then show that bonobos show less severe forms of aggression than chimpanzees, *Pan troglodytes*, and suggest that this difference evolved because of relaxed feeding competition. We next review evidence that phenotypic differences in morphology and behaviour between bonobos and chimpanzees are analogous to differences between domesticates and their wild ancestors. We then synthesize the first set of a priori experimental tests of the self-domestication hypothesis comparing the psychology of bonobos and chimpanzees. Again, bonobo traits echo those of domesticates, including juvenilized patterns of development. We conclude that the self-domestication hypothesis provides a plausible account of the origin of numerous differences between bonobos and chimpanzees, and note that many of these appear to have arisen as incidental by-products rather than adaptations. These results raise the possibility that self-domestication has been a widespread process in mammalian evolution, and suggest the need for research into the regulatory genes responsible for shifts in developmental trajectories in species that have undergone selection against aggression.

NEW YORK TIMES BESTSELLER

— BRIAN HARE and VANESSA WOODS —

THE GENIUS OF DOGS

HOW DOGS ARE SMARTER THAN YOU THINK

What are we asking about the dog's mind?

Do dogs imitate?

Are dogs capable of intentional deception?

Do dogs know what you can and cannot see?

Do dogs know what you do and do not know?

Do dogs understand symbols like children?

How do dogs navigate?

Do dogs take short cuts?

Do dogs understand any causal properties of the world (i.e. gravity)

Do dog breeds differ?

Rico learns words like our infants

Phillip the action mimic!

What are we doing with what we learn?

Do dogs imitate?

Are dogs capable of intentional deception?

Do dogs know what you can and cannot see?

Do dogs know what you do and do not know?

Do dogs understand symbols like children?

How do dogs navigate?

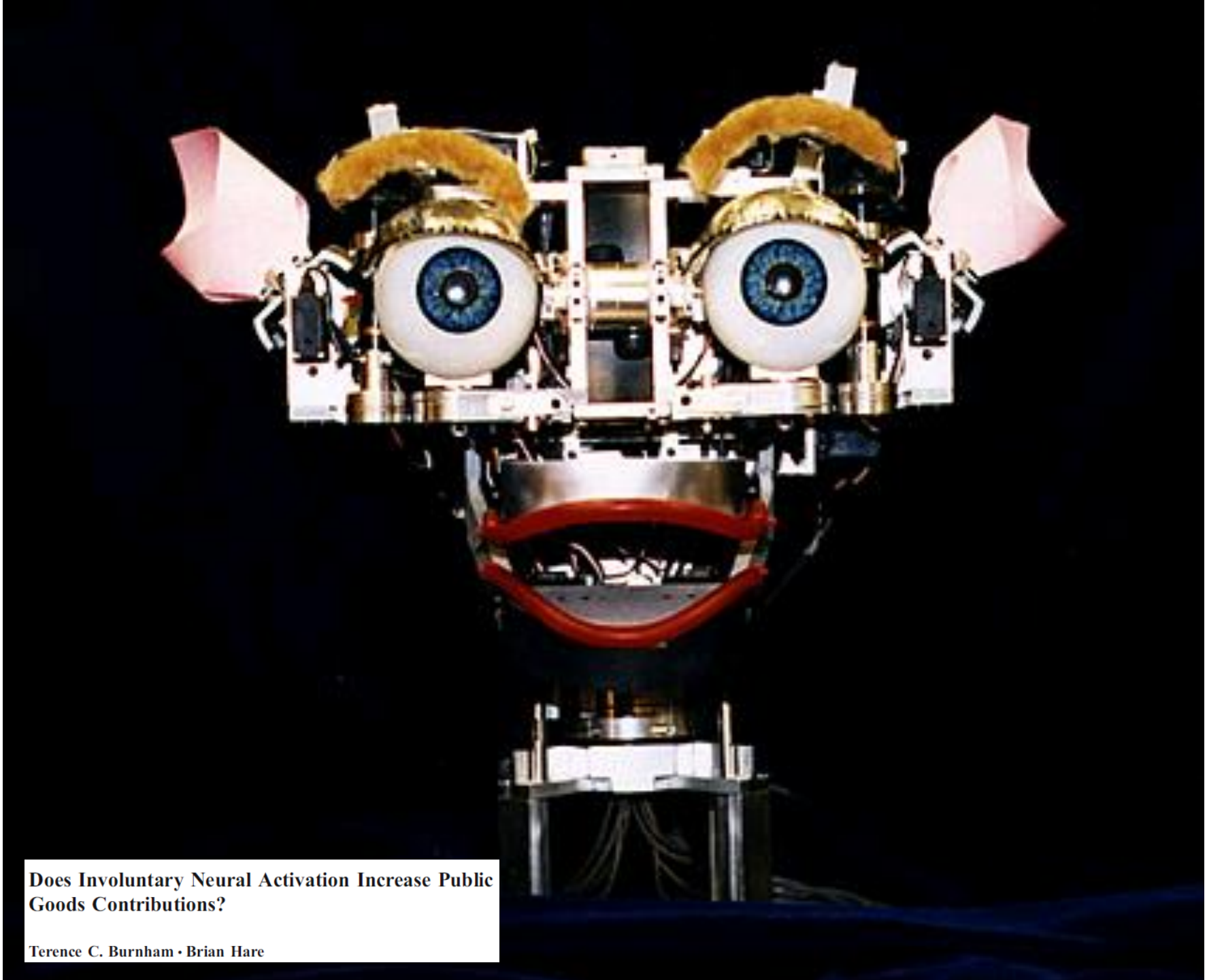
Do dogs take short cuts?

Do dogs understand any causal properties of the world (i.e. gravity)

Do dog breeds differ?

Service Dogs

Military Dogs



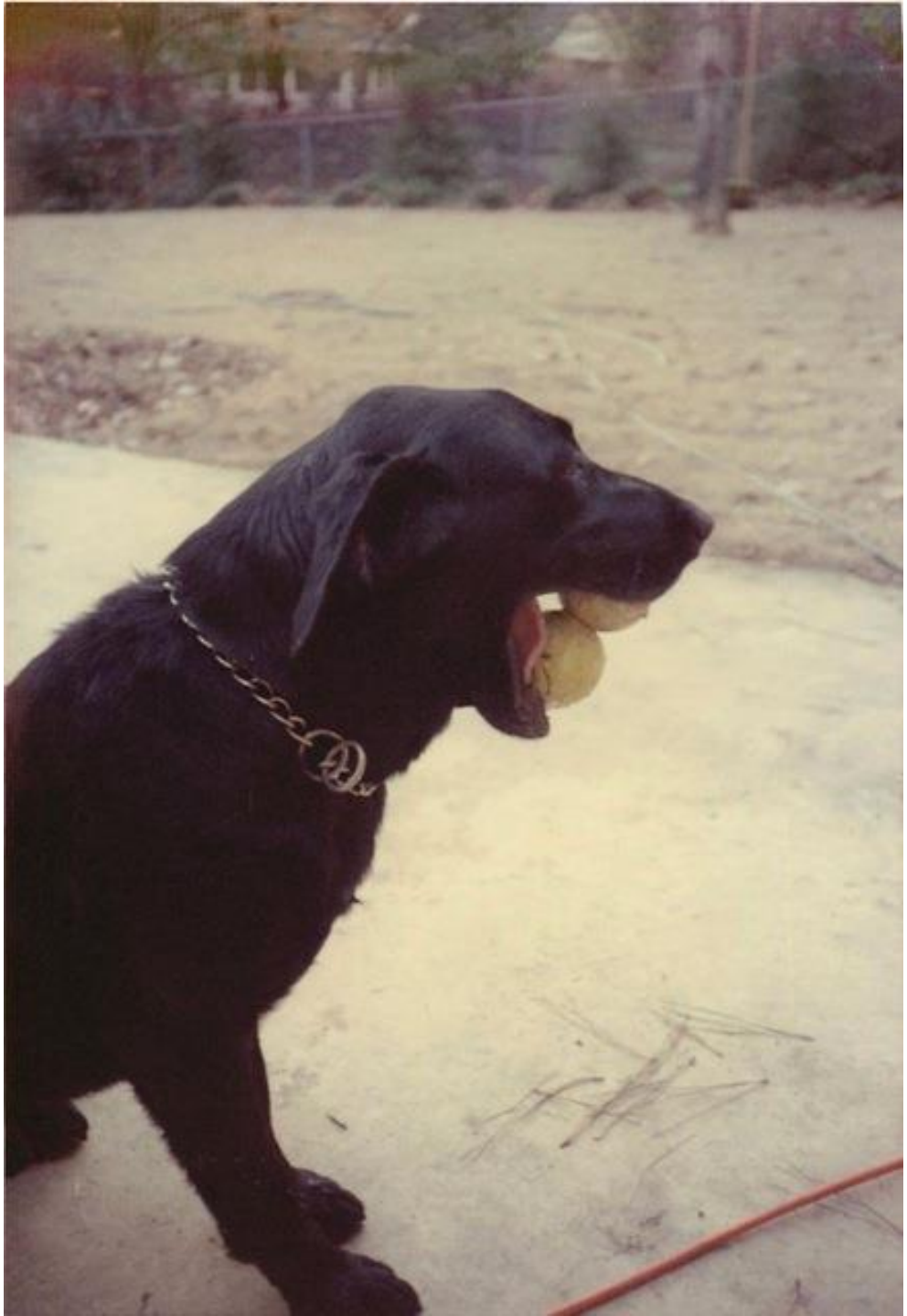
Does Involuntary Neural Activation Increase Public Goods Contributions?

Terence C. Burnham · Brian Hare

Reliance on head versus eyes in the gaze following of great apes and human infants: the cooperative eye hypothesis

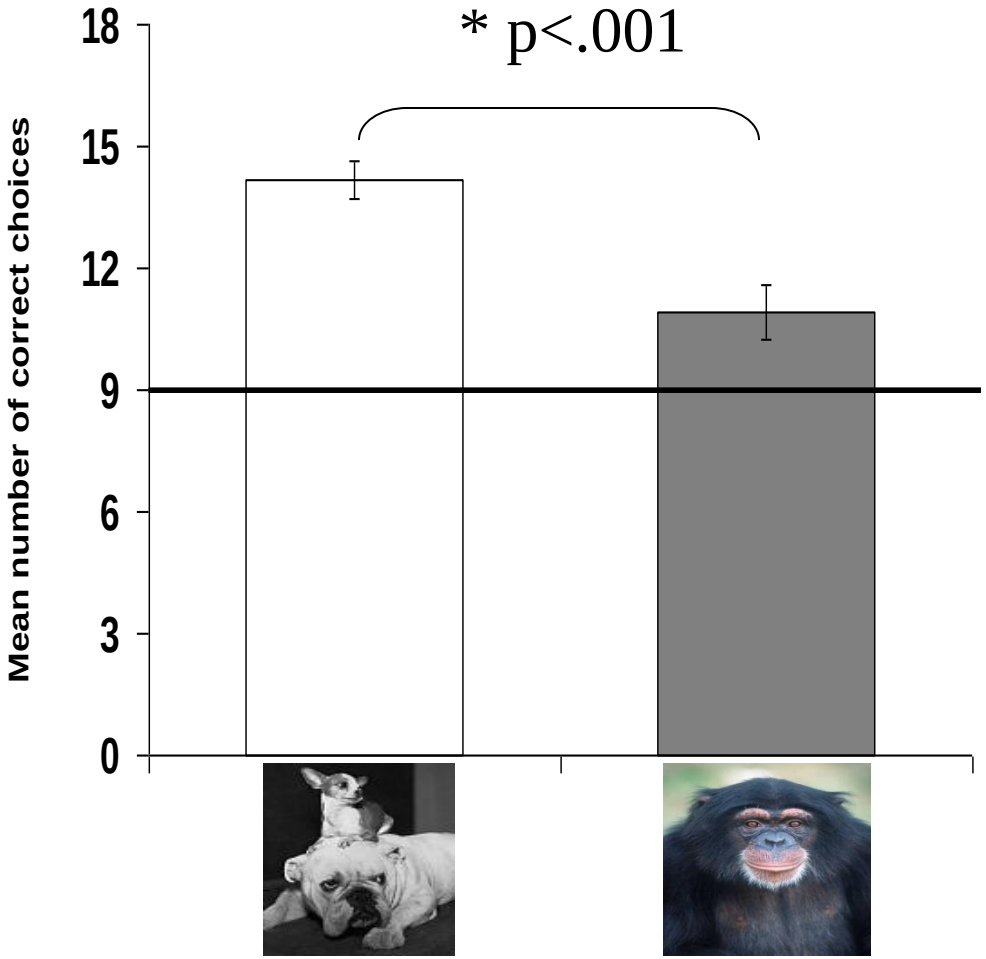
Michael Tomasello*, Brian Hare, Hagen Lehmann, Josep Call

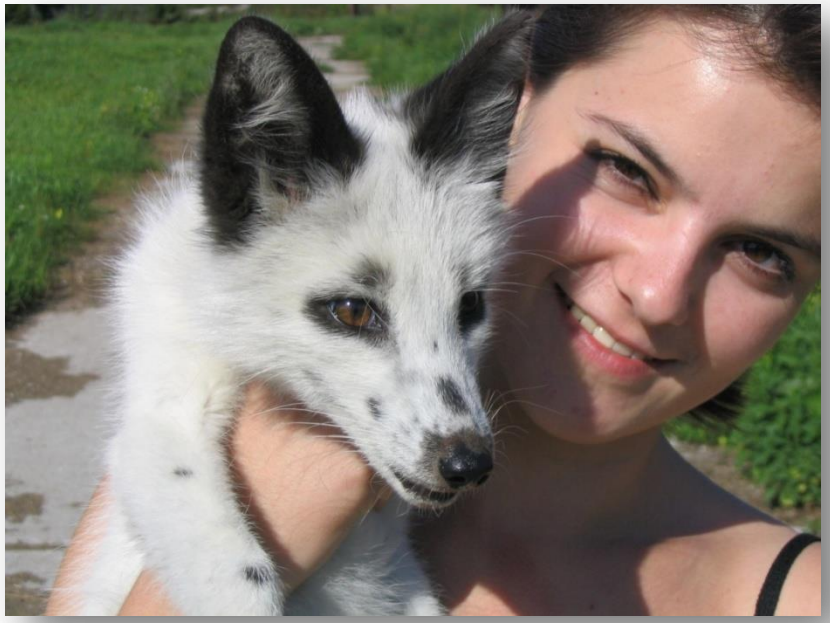
Nettle et al 2012, PLoS One



Dogs outperform chimpanzees in a number of cooperative-communicative tests

Hare, et al, 2002, *Science*





Review TRENDS in Cognitive Sciences Vol.9 No.9 September 2005

Human-like social skills in dogs?

Brian Hare and Michael Tomasello

Max Planck Institute for Evolutionary Anthropology, Deutscher Platz 6, Leipzig, Germany

Domestic dogs are unusually skilled at reading human social and communicative behavior – even more so than our nearest primate relatives. For example, they use human social and communicative behavior (e.g. a pointing gesture) to find hidden food, and they know what the human can and cannot see in various situations. Recent comparisons between canid species suggest that these unusual social skills have a heritable component and initially evolved during domestication as a result of selection on systems mediating fear and aggression towards humans. Differences in chimpanzee and human temperament suggest that a similar process may have been an important catalyst leading to the evolution of unusual social skills in our own species. The study of convergent evolution provides an exciting opportunity to gain further insights into the evolutionary processes leading to human-like forms of cooperation and communication.

comparative work has begun to identify the selection pressures that drove the evolution of these skills, and, further, suggests that a similar process played a role in shaping human social skills as well.

Human-like social skills in dogs?

The test is simple. Hide a piece of food or an attractive object in one of several opaque containers, and then look at or point to that location in an attempt to help the subject find the hidden object. Human infants find this task trivially easy from around 14 months of age, as they are just beginning to learn language [5]. However, perhaps surprisingly, chimpanzees, so impressive in solving so many other social problems, show little skill in using such social-communicative behaviors to solve this task (see Box 1). Meanwhile, give domestic dogs a crack at it and they show impressive flexibility in solving the same problem [6,7].